"Note on the Experimental Junction of the Vagus Nerve with the Cells of the Superior Cervical Ganglion." By J. N. LANGLEY, D.Sc., F.R.S., Fellow of Trinity College, Cambridge. Received January 26,—Read February 3, 1898.

Two experiments were made on cats. The central end of the vagus, cut a little below the larynx, was turned forward and joined to the peripheral end of the cervical sympathetic. The object of the experiments was to see whether the vagus nerve fibres are capable of forming connexions with any of the structures with which the spinal nerve fibres of the cervical sympathetic are normally connected. The results seem to me to be conclusive as regards this point.

The time allowed for regeneration was in one case 73 days, and in the other 123 days. At the end of these periods anæsthetics were again given, and the nerves stimulated.

Stimulation of the sympathetic in the lower region of the neck, *i.e.*, of its central end, gave no effect of any kind. Hence the central end of the sympathetic had formed no functional connexions with the peripheral end.

Stimulation of the sympathetic a little below the superior cervical ganglion caused reflex effects of the kind caused by vagus stimulation. These reflexes were obvious in the case in which 123 days had been allowed for regeneration, less clear in that in which seventy-three days only had been allowed. They ceased on section of the vagus close to the ganglion of the trunk. Thus afferent fibres of the vagus had grown outwards amongst, or joined with, the fibres of the peripheral end of the sympathetic.

The stimulation also caused all the effects normally produced by stimulation of the cervical sympathetic, so that, although the central end of the sympathetic had not joined the peripheral end, the peripheral end had acquired more or less completely its normal function.

Stimulation of the vagus a little below the ganglion of the trunk —the nerve being cut centrally of the point stimulated—caused dilation of the pupil, retraction of the nictitating membrane, contraction of the arteries of the ear, erection of the hairs of the face secretion of the sub-maxillary gland, and the other effects normally caused by stimulating the cervical sympathetic.

After injection of nicotine no effect was obtained by stimulating the nerves centrally of the superior cervical ganglion; the usual effects following when the ganglion itself was stimulated.

Hence, efferent fibres of the vagus had either grown along the

peripheral end of the cervical sympathetic, and formed nerve-endings around the cells of the superior cervical ganglion, or they had united directly with the sympathetic fibres. That the former had taken place I infer from the fact that the regenerated nerve contained medullated fibres larger than those proper to the sympathetic.

I conclude from the experiments that there is no essential difference between the efferent "visceral" or "involuntary" nerve fibres, whether they leave the central nervous system by way of the cranial nerves, by way of the sacral nerves, or by way of the spinal nerves to the sympathetic system. All of these fibres I take to be pre-ganglionic fibres. And I think that any pre-ganglionic fibre is capable, in proper conditions, of becoming connected with any nerve cell with which a pre-ganglionic fibre is normally connected; although apparently this connexion does not take place with equal readiness in all cases. On the whole it appears to me that the functions exercised both by pre-ganglionic and by post-ganglionic fibres depend less upon physiological differences than upon the connexions which they have an opportunity of making during the development of the nervous system and of the other tissues of the body.

A fuller account of the observations will be published in the 'Journal of Physiology,' after some further experiments have been made.

"Researches in Vortex Motion. Part III. On Spiral or Gyrostatic Vortex Aggregates." By W. M. Hicks, F.R.S. Received January 12,—Read February 3, 1898.

(Abstract.)

A portion of the communication (Sect. II) extends the theory of the simple spherical vortex discovered by Hill. The chief part (Sects. I and III) refers, however, to a kind of gyrostatic aggregate. The investigation has brought to light an entirely new system of spiral vortices. To give an idea of the species of motion considered, take the case of motion of an infinitely long cylindrical vortex of sectional radius a. The velocity perpendicular to the axis inside the vortex will be of the form $v = f(r)$ where $f(o) = 0$. Outside it will be given by $v = \mathrm{V}a/r$ where $\mathrm{V} = f(a)$.

We may, however, have a motion in which the fluid moves parallel to the axis inside the cylinder with rest outside. The velocity will be of the form $u = \mathrm{F}(r)$ inside, where $\mathrm{F}(a) = 0$, and zero outside. Both $f(r)$ and $\mathrm{F}(r)$ are arbitrary functions subject only to the conditions $f(0) = 0$ and $\mathrm{F}(a) = 0$. Putting aside for the present the